Tutorial No. 1 : Overview of Computer Networks

Exercise 01:

1. What is a computer network?
2. What is the purpose of a computer network?
3. Define the following terms: PAN, LAN, MAN, WAN, Protocol, topology?
4. What is the difference between the broadcast mode and the point-to-point mode in a communication system?
5. Give the advantage and disadvantage of partial mesh topology.
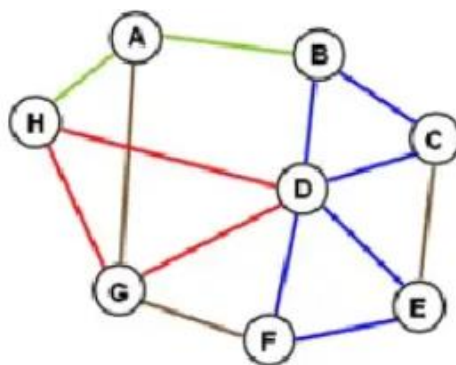6. List the physical and logical elements of a communication network.

Exercise 02:

1. Explain, using the following diagram, the difference between connection-oriented mode and connectionless mode in a communication system.

2. List the advantage and disadvantage of each type.
3. What happens if a message does not reach its destination in connectionless mode? Explain this using a diagram.

Exercise 03:

Consider the following network

Let $M = m_0,\ldots,m_n$ be the message that node H wants to send to node E.
1. Explain the sending of this message through the following connection strategies (also show the state of the queues at the intermediate nodes).

- Circuit switching
- Message switching
- Packet switching
- Cell switching

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2. What type of switching is used on the internet? Why?

Exercise 04:

1. Explain the operation of each network architecture below using a diagram
   - Peer-to-peer (P2P) architecture
   - Client/server architecture
   - Three-tier architecture

2. Give the advantages and disadvantages of each architecture.
3. What architecture is commonly used on the internet today, and why?

BankCustomer is a bank that allows its clients to access their bank accounts via a website. To do this, the client enters their username (login) and password via a form and waits for the server to grant access to their account.

4. What architecture is used by this bank?

6. Show in a diagram where the following elements, operations, and checks are located:

   - The form for entering the username and password
   - Check if the username and/or password fields are empty
   - Verify the existence of this user in the database
   - The error message sent to the user in case of an error with the username or password
   - The transformation of the user's request into an SQL query